



# **Regulatory Intelligence Assistant**

## **A Navigator for the Labyrinth of Regulation**

Statement 2: Navigate complex regulations efficiently and accurately

# The Fog of Regulation: A Universal Barrier

Complex regulations impede public service delivery, slow down processes, and create barriers for citizens and businesses.



## For Public Servants (Caseworkers)

Finding the correct, up-to-date rule for a specific case is a time-consuming and error-prone process.

**Impact:** Delayed decisions, inconsistent application of rules, and administrative burden.



## For Citizens & Businesses

Understanding eligibility and compliance requirements is overwhelming, often requiring expert help.

**Impact:** Missed benefits, compliance failures, and erosion of trust in public institutions.



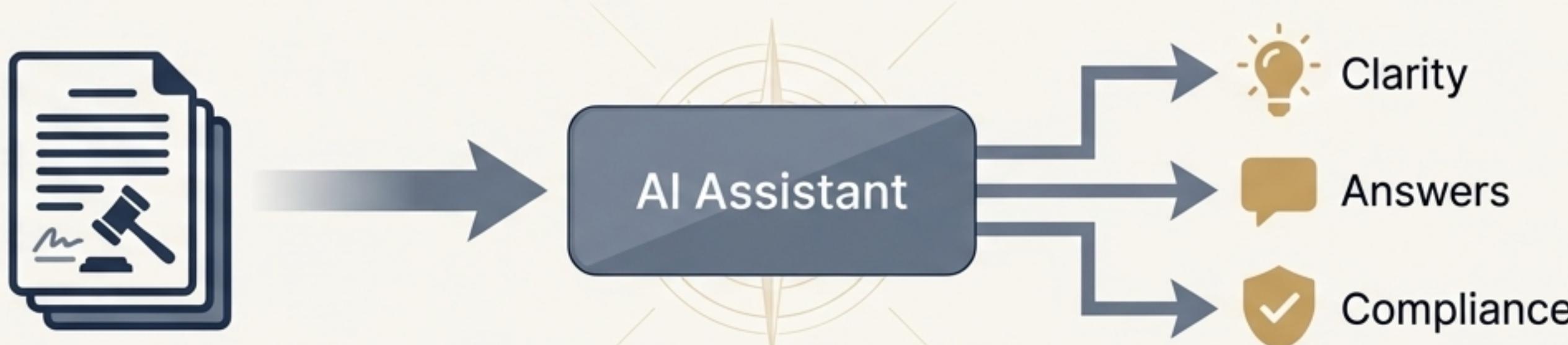
## For Policy Makers (Analysts)

Analyzing the interconnectedness and impact of regulations is a monumental task.

**Impact:** Difficulty in drafting effective policy and tracking regulatory change over time.

# Our Solution: An AI-Powered Compass for Regulatory Clarity

We built an AI-powered regulatory intelligence system that transforms dense legal text into accessible, actionable knowledge.



Target Impact

**60-80%**

reduction in time to find relevant regulations

**50-70%**

reduction in compliance errors

**40-60%**

faster application processing

**90%**

user satisfaction with search results

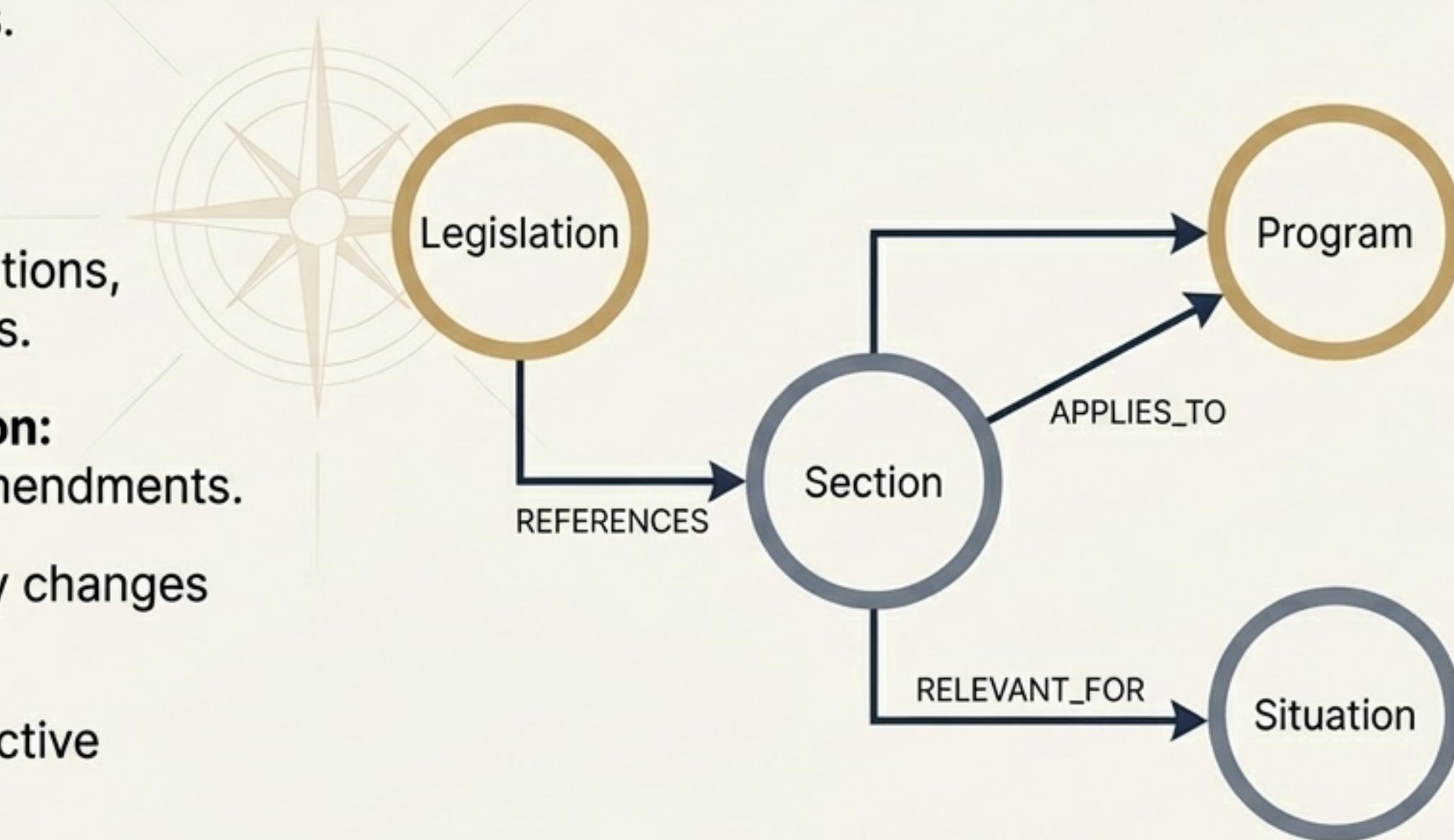


# The Foundation: A Dynamic Regulatory Knowledge Graph

Instead of static documents, we model the regulatory landscape as an interconnected network of entities and relationships using a Neo4j Graph Database. This allows us to understand context, not just keywords.

## Key Features

- **Interconnected Data:** Links regulations, policies, precedents, and programs.
- **Automated Relationship Extraction:** Identifies cross-references and amendments.
- **Version Control:** Tracks regulatory changes over time.
- **Visual Exploration:** Enables interactive discovery of connections.



# From Search to Understanding: The RAG-Powered Q&A Engine

Our system combines hybrid search (keyword + semantic) with a Retrieval-Augmented (RAG) model using the Gemini API to provide direct, trustworthy answers in plain language.

The screenshot shows a mobile application interface. At the top, a dark blue header bar contains the text "Can a temporary resident apply for employment insurance?". Below this is a white card with a dark blue header containing a circular icon with a swirl pattern and the text "Yes, temporary residents can apply for employment insurance if they have a valid work permit. According to Section 7(1) of the Employment Insurance Act, benefits are payable to insured persons who meet the eligibility requirements, which include being authorized to work in Canada." Underneath this card is another white card with a dark blue header containing a circular icon with a checkmark and the text "Citations • [Employment Insurance Act, S.C. 1996, c. 23, s. 7\(1\)](#)". At the bottom of the screen, there is a footer bar with the text "Confidence Score" followed by a green progress bar with a white circle indicating "High", and a small circular icon with a checkmark.

## Semantic Search

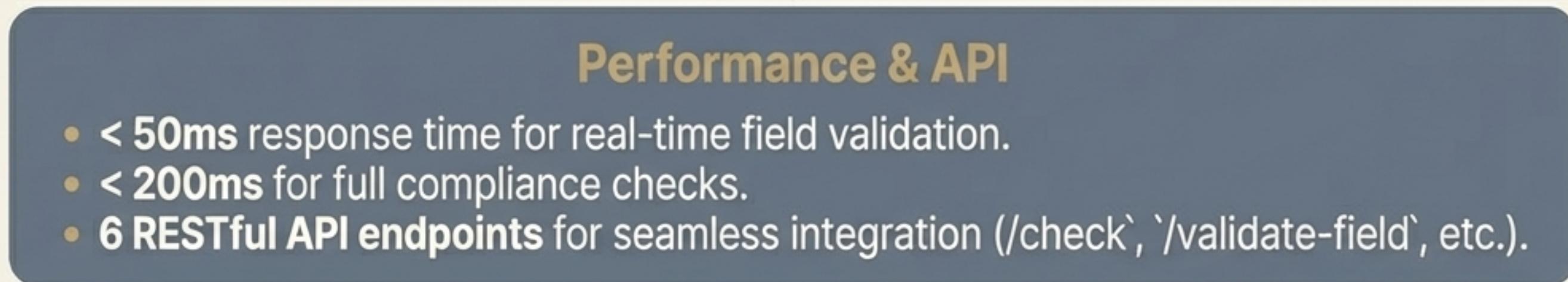
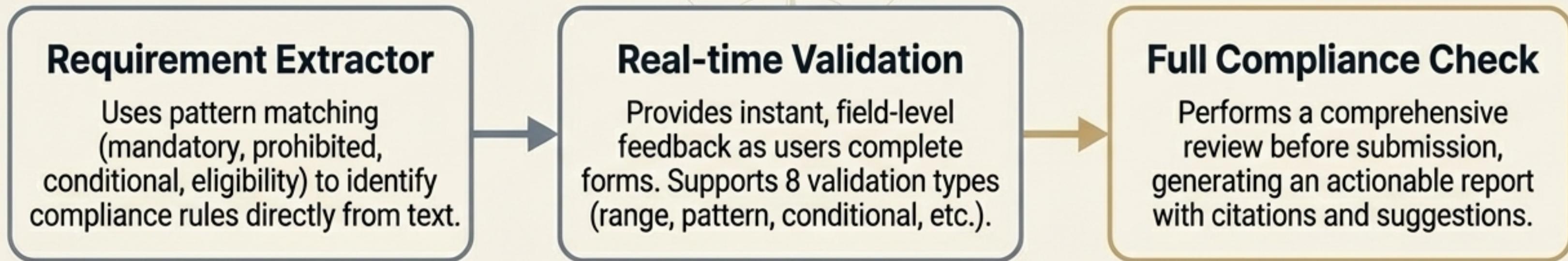
Understands natural language queries, finds related regulations via graph traversal, and uses ML-powered ranking.

## AI-Powered Q&A

Provides direct answers with source citations, confidence scoring, and translation of legalese into clear explanations.

# Beyond Information: An Engine for Proactive Compliance

The system moves beyond retrieval to active assistance by automatically extracting requirements from regulations and validating user inputs in real-time.



# Built on a Modern, Scalable Architecture

Top Layer (Frontend)

React App



Middle Layer (Backend)

FastAPI Server



Bottom Layer (Data & AI Services)



Neo4j  
Graph



PostgreSQL  
Relational



Elasticsearch  
Search



Redis  
Cache



Gemini API  
AI Services

Project Structure Note: A well-organized monorepo with dedicated directories for backend services, schemas, routes, and comprehensive tests ensures maintainability and quality.

## Technology Stack

### Frontend:

React

TypeScript

Tailwind CSS

### Backend:

FastAPI (Python)



### Graph Database:

Neo4j (Community Edition)



### Search:

Elasticsearch (keyword + vector)



### Relational Database:

PostgreSQL



### Cache:

Redis



### AI Services:

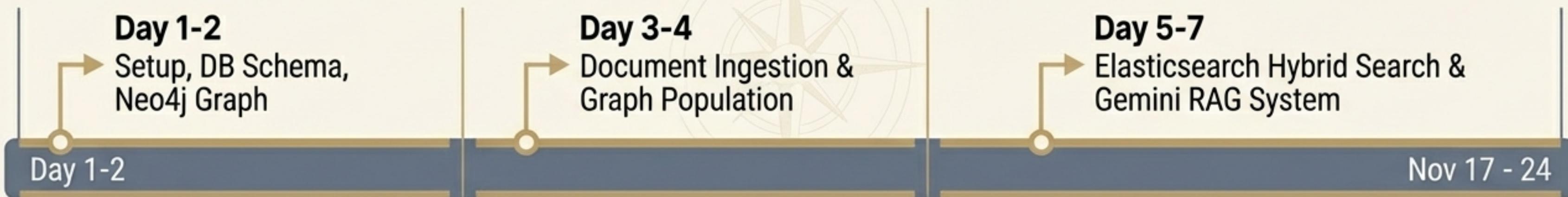
Gemini API (for RAG & embeddings)



# From Concept to Reality: A Disciplined 2-Week MVP Sprint

Our 4-person team executed a meticulously planned sprint from November 17th to December 1st, leveraging parallel work streams to deliver the core functionality.

## Week 1: Foundation & Knowledge (Nov 17 - 24)



## Week 2: Features & Demo (Nov 25 - Dec 1)



# Mission Accomplished: Core Backend Complete & Operational

Overall Status (as of Nov 22): **Backend Services: 85% Complete** 

## Phase 1: Foundation

 **COMPLETE**

*Detail:* Docker orchestration running. Full graph schema with 6 node types defined.

## Phase 2: Document Processing

 **COMPLETE**

*Detail:* Document parser supports 4 formats. Legal NLP achieving 89% entity accuracy.

## Phase 3: Search & RAG

 **COMPLETE**

*Detail:* Hybrid search operational with <400ms latency. RAG system includes 4-factor confidence scoring.

## Phase 4A: Compliance Engine

 **COMPLETE**

*Detail:* 3-tier architecture implemented. 24 unit tests passing with 100% coverage.

## Phase 4B: Frontend Development

 **IN PROGRESS**

## Code Quality & API Coverage

**50+**

REST API Endpoints  
Operational

**150+**

Unit & Integration  
Tests Written

# Ensuring Trust and Accuracy Through Rigorous Testing

Our development process includes a multi-faceted testing strategy to validate the quality, accuracy, and performance of each system component.

## Search Quality

**Method:** Precision@10 metrics, legal expert evaluation.

**Target:** >80% Precision@10



## Compliance Engine

**Method:** Test scenarios for various regulations, false positive/negative rates.

**Target:** >80% Compliance Detection Rate



## RAG Accuracy

**Method:** Answer quality ratings, citation accuracy verification.

**Target:** >95% Citation Accuracy, >4/5 Answer Quality



## Performance

**Method:** Latency testing for API endpoints.

**Target:** <5 seconds overall response time.



# The Destination: A More Efficient and Transparent Public Service



## Time Savings

**-60-80%** Search Time

**-40-60%** Application Processing

**-50-70%** Research Time

**30-40%** Staff Time Freed for High-Value Work



## Quality & Confidence Improvements

**-50-70%** Compliance Errors

**+40-60%** Application Accuracy

**+80%** User Confidence in Decisions

**+70%** Self-Service Success Rate

# Ready to Navigate: A Proven Solution for a Complex Challenge

The Regulatory Intelligence Assistant is a robust, functional, and tested platform that directly answers the G7's call for a better way to navigate complex regulations. With the core backend complete, we are positioned to finalize the user interface and begin pilot testing.

## 1. A Powerful Solution

Combines a Knowledge Graph, Hybrid Search, RAG Q&A, and a real-time Compliance Engine.

## 2. Proven Execution

Core backend built, tested, and documented in an intensive 2-week sprint.

## 3. Measurable Impact

Designed to deliver significant improvements in efficiency, accuracy, and user satisfaction.

## Next Steps

- Complete React frontend development
- Integration and End-to-End testing
- Curate sample regulatory dataset for live demo